Laboratory observations of spontaneous magnetic reconnection

JAN EGEDAL, WILL FOX, NOAM KATZ, MIKLOS PORKOLAB, PSFC, MIT, Cambridge, USA — Detailed measurements of spontaneous magnetic reconnection are presented. The experimental data, which were obtained in the new closed VTF magnetic configuration, document the profile evolution of the plasma density, current density, magnetic flux function, reconnection rate and the current density during a spontaneous reconnection event in the presence of a strong guide magnetic field. The reconnection process is at first slow, which allows magnetic stress to build in the system while the current channel becomes increasingly narrow and intense. The onset of a fast reconnection event occurs as the width of the current channel approaches the ion sound Larmor radius, $\rho_s$.

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